Letter from W. M. Mitchell to Alexander Melville Bell, October 9, 1903, with transcript

AVIATION — Miscellaneous Copy of letter written by W.M. Mitchell. Beddeck, N. S., October 9, 1903. Professor A. Melville Bell, Harrowsmith, Canada. Dear Mr. Bell:

Dr. Graham Bell requests that I forward to you, the enclosed copy of a letter which he has written to Mr. Octave Chanute.

Dr. Bell has just returned from a pleasant, though short visit to Washington where he attended the meeting of the Executive Board of the Smithsonian Regents. While in Washington he saw Mrs. Hubbard, Mr. and Mrs. Grosvenor, and Mr. and Mrs. Charles Bell, and they were all enjoying good health.

Dr. Bell is feeling much better after his little trip and I am glad to say that all are well at Beinn Bhreagh with the exception of Miss Marian who is suffering from a bad cold and a light fever. The Doctor came this morning and she is now feeling better and we all hope for a complete restoration to good health in a few days.

I trust that you and Mrs. Bell and Miss Mace have been having pleasant weather and enjoying good health since leaving here, but Dr. Bell would like to know WHERE you are.

With kindest regards to you and Mrs. Bell and Miss Mace, in which one and all join, I am,

Yours sincerely, (Signed) W. M. Mitchell.

AVIATION — Miscellaneous Copy of a typed copy of a letter written by Alexander Graham Bell to Octave Chanute, relative to experiments with the tetrahedral kites, etc. Also copy of letter from Secretary Mitchell. (Copy of letter written by Dr. Bell in his own handwriting to

Mr. Octave Chanute. W. M. M.) Baddeck, Nova Scotia, September 29, 1903. Mr. Octave Chanute, 14 E. Huron Street, Chicago, Illinois. My dear Sir:

Your note of September 21 was received in due course and I have since received the photograph of the "Albatross" and the copy of "L'Aerophile" which you have been kind enough to send me. For all — my thanks.

I understand French sufficiently well to read your article with ease and so will not trouble you for the English copy.

You ask whether my method of construction promises to save weight in proportion to lifting surface and this without undue head-resistance from so many edges as pertain to the tetrahedral principle.

I think you will be able to answer these questions yourself better than I can if I give you a few data concerning the maximum and minimum flying-weights of successful kites of pure tetrahedral construction.

1. I have already sent you photographs of my lightest flying tetrahedral kite (See Photos. Nos. 57 and 58). This kite has the form of a regular tetrahedron with a side of two metres. It is composed of 64 tetrahedral cells each having a side of 25 cm. The framework is of spruce, and the wing-surfaces of silk weighing about 40 gms. to the 2 square metre. The whole kite weighs 744 grammes, and the total amount of silk surface is 3.4640 Sq. M. The flying-weight, according to my method of computation is therefore, 214.7 gms. per Sq. M. of surface.

It must be remembered however that in such kites all the surfaces are oblique — the under-surfaces making an angle with the horizon of about 55°. As there are neither horizontal nor vertical surfaces it is a little difficult to know how to institute comparisons with other kinds of kites. I think the best way to do this will be to compute the area of the projection of the wing-surfaces upon a horizontal plane — and consider this area as the

true supporting surface. This may not be exact (See Nature, Aug. 13, Vol. 68, p. 348 foot-note) but it at all events affords a simple method of approximating to the truth.

In the present case (Kite photo. 57) the total supporting surface may be considered as equivalent to a horizontal surface of two square metres — which brings the flying-weight — for purposes of comparison — up to 372 gms. per sq. M. of horizontal surface.

In regard to head resistance I estimate that the summation of the edge-surfaces forming the front face of the kite forms a resistance opposed to the wind of about 987.5 sq. cm.

This kite was specially constructed to be as light as possible; and it flies so well that there is rarely a day when it will not support itself in the air — if first raised to a height by running with the cord — even though the air at the surface may be calm.

2. In contrast to this I give you some data concerning my heaviest flying tetrahedral kite. See enclosed photographs Nos. 29, 3 30 and 33. This kite has the form of a regular tetrahedron with a side of four metres. It is composed of 64 cells each having a side of 50 cm. Framework of spruce; wing-surfaces of white cotton cloth weighing 160 gms. per sq. M. Weight of kite 9.548 kilogrammes; total surface 13.8560 sq. metres; flying weight 689.1 gms. per Sq. M. of surface. (Resolved horizontal surface 8 sq. M. Re-constructed flying-weight 1193.5 gms. per sq. M. of horizontal surface).

Head resistance; Edges of front cells oppose to wind a surface of about 4050 sq. cm.

This kite flew well in a moderate breeze (probably ten miles an hour), but the pull proved to be inconveniently great for handling without special appliances, and a Manila rope had to be used as the flying cord. The method of handling is shown in the enclosed photographs No. 36, 37 and 38.

Although the cross-section of the individual sticks used in this kite was only 1 × 0.5 cm. (50 sq. millimetres) the resulting structure seemed to be solid enough for any practicable

purpose. The mode of construction however led to a doubling of the sticks at the edges and this materially strengthened the whole frame.

I am now experimenting with a method of combining horizontal and oblique surfaces which gives great promise of reducing the ratio of weight to surface in a strong structure, but I am a little doubtful yet as to whether the kites will prove to be as steady in the air as those of pure tetrahedral construction, because I am using large continuous surface.

4

In multi-cellular kites of pure tetrahedral construction we have forms that seem to possess automatic stability in the air — the steadiness of flight in a gusty wind being really remarkable. This stability is due largely, I think, to the use of a multitude of small surfaces well separated from one another — the wind strains during gusts being well distributed throughout the whole structure instead of being concentrated mainly upon one part.

I fancy also that the shifting of the center of pressure under varying conditions of wing-angle, wind force etc. is less when the surfaces are separated than when combined. If the resultant center of pressure for the whole structure shifts to the same extent — and the same extent only — as the individual centres of pressure of the scattered surfaces, then the smaller the area of the individual surfaces the less will be the possible shifting of the resultant centre of pressure and the greater the stability of the kite as a whole. This principle points to a mode of construction utilizing small surfaces and many of them.

Yours sincerely, (Signed) Alexander Graham Bell. Enclosed please find kite photos. Nos. 29, 30, 33, 36, 37 and 38. A. G. B.